Pipefitters Math

Name:_____ Date:_____

Formulas and Word Problems

Formulas

Volume of a Rectangular Tank

$$V = \text{length} \times \text{width} \times \text{height}$$

Volume of a Cylindrical Pipe

$$V = \pi \times \left(\frac{\text{diameter}}{2}\right)^2 \times \text{length}$$

Flow Rate

$$\text{Total Flow} = \text{Flow Rate} \times \text{Time}$$

Conversion between Inches and Feet

$$1\,\text{foot} = 12\,\text{inches}$$

Clearance

$$\text{Clearance} = \text{Inner Diameter} - \text{Outer Diameter}$$

Word Problems

1. A rectangular tank has dimensions 6 feet in length, 4 feet in width, and 3 feet in height. Calculate the volume of the tank in cubic feet.

2. A cylindrical pipe has a diameter of 8 inches and a length of 10 feet. Calculate the volume of the pipe in cubic inches.

3. Water flows through a pipe at a rate of 3 gallons per minute. How many gallons will flow through the pipe in 2 hours?

4. You have a pipe with an outer diameter of 5 inches that needs to fit into a fitting with an inner diameter of 5.25 inches. What is the clearance between the pipe and the fitting?

5. You need to cut a 100-foot long pipe into sections of 8 feet each. How many full sections will you get, and what will be the length of the remaining piece?

6. A pipe is 20 feet long. If you cut off 4 feet, how long is the remaining piece?

7. You need to join two pipes, one is 7.5 feet and the other is 6.25 feet. What is the total length of the pipe after joining?

8. Each section of pipe costs $15.75. How much would 5 sections cost?

9. You have a 50-foot long pipe and need to cut it into 5 equal sections. How long is each section?

10. A cylindrical tank has a radius of 3 feet and a height of 10 feet. Calculate the volume of the tank in cubic feet.

Solutions

1. Volume of a Rectangular Tank

Problem: A rectangular tank has dimensions 6 feet in length, 4 feet in width, and 3 feet in height. Calculate the volume of the tank in cubic feet.

Formula

$$V = \text{length} \times \text{width} \times \text{height}$$

Solution:

$$V = 6\,\text{ft} \times 4\,\text{ft} \times 3\,\text{ft} = 72\,\text{cubic feet}$$

2. Volume of a Cylindrical Pipe

Problem: A cylindrical pipe has a diameter of 8 inches and a length of 10 feet. Calculate the volume of the pipe in cubic inches.

Formula

$$V = \pi \times \left(\frac{\text{diameter}}{2}\right)^2 \times \text{length}$$

Solution:

$$\text{Diameter} = 8\,\text{inches}, \quad \text{Radius} = \frac{8}{2} = 4\,\text{inches}$$

$$\text{Length} = 10\,\text{feet} = 10 \times 12 = 120\,\text{inches}$$

$$V = \pi \times (4)^2 \times 120 \approx 3.14 \times 16 \times 120 = 6,028.8\,\text{cubic inches}$$

3. Flow Rate

Problem: Water flows through a pipe at a rate of 3 gallons per minute. How many gallons will flow through the pipe in 2 hours?

Formula

$$\text{Total Flow} = \text{Flow Rate} \times \text{Time}$$

Solution:

$$\text{Flow Rate} = 3\,\text{gallons/minute}, \quad \text{Time} = 2\,\text{hours} = 2 \times 60\,\text{minutes} = 120\,\text{minutes}$$

$$\text{Total Flow} = 3\,\text{gallons/minute} \times 120\,\text{minutes} = 360\,\text{gallons}$$

4. Clearance

Problem: You have a pipe with an outer diameter of 5 inches that needs to fit into a fitting with an inner diameter of 5.25 inches. What is the clearance between the pipe and the fitting?

Formula

$$\text{Clearance} = \text{Inner Diameter} - \text{Outer Diameter}$$

Solution:

$$\text{Inner Diameter} = 5.25\,\text{inches}, \quad \text{Outer Diameter} = 5\,\text{inches}$$

$$\text{Clearance} = 5.25\,\text{inches} - 5\,\text{inches} = 0.25\,\text{inches}$$

5. Cutting Pipe Sections

Problem: You need to cut a 100-foot long pipe into sections of 8 feet each. How many full sections will you get, and what will be the length of the remaining piece?

Solution:

$$\text{Total Length} = 100\,\text{feet}, \quad \text{Section Length} = 8\,\text{feet}$$

$$\text{Number of Full Sections} = \left\lfloor \frac{100\,\text{feet}}{8\,\text{feet}} \right\rfloor = 12\,\text{sections}$$

$$\text{Remaining Length} = 100\,\text{feet} - (12 \times 8\,\text{feet}) = 100\,\text{feet} - 96\,\text{feet} = 4\,\text{feet}$$

6. Pipe Length after Cutting

Problem: A pipe is 20 feet long. If you cut off 4 feet, how long is the remaining piece?

Solution:

$$20\,\text{feet} - 4\,\text{feet} = 16\,\text{feet}$$

7. Total Length of Joined Pipes

Problem: You need to join two pipes, one is 7.5 feet and the other is 6.25 feet. What is the total length of the pipe after joining?

Solution:

$$7.5\,\text{feet} + 6.25\,\text{feet} = 13.75\,\text{feet}$$

8. Cost of Pipe Sections

Problem: Each section of pipe costs \$15.75. How much would 5 sections cost?

Solution:

$$5 \times 15.75 = 78.75\,\text{dollars}$$

9. Equal Sections of Pipe

Problem: You have a 50-foot long pipe and need to cut it into 5 equal sections. How long is each section?

Solution:

$$\frac{50\,\text{feet}}{5} = 10\,\text{feet}$$

10. Volume of a Cylindrical Tank

Problem: A cylindrical tank has a radius of 3 feet and a height of 10 feet. Calculate the volume of the tank in cubic feet.

Formula

$$V = \pi \times \text{radius}^2 \times \text{height}$$

Solution:

$$\text{Radius} = 3\,\text{feet}, \quad \text{Height} = 10\,\text{feet}$$

$$V = \pi \times (3)^2 \times 10 \approx 3.14 \times 9 \times 10 = 282.6\,\text{cubic feet}$$